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TYPED NAME Stephen E. Baldwin, Reg. No. 27,769

SIGNED

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

This is a request for filing a

- ☒ Continuation
☐ Continuation-in-Part (supplemental declaration required; see item 10)
☐ Divisional

application under 37 C.F.R. 1.60 (Continuation or Divisional Application for Invention Disclosed in a Prior Application) of prior application Serial No. 08/513,573 on August 10, 1995 in the names of Peter Lu, Jeffrey Heaton, James W. Heaton, Peter Loh Hang Pao, Robert Loke Hang Lam and Tsang Kei Sun for ELECTRONIC SURFACE MOUNT PACKAGE

(Title of Invention).

1. ☒ Enclosed is a copy of the prior application, including the oath or declaration, as originally filed. (See 8(a) and (b) for drawing requirements.)
2. (a) ☐ Enclosed is a Small Entity Affidavit.
(b) ☒ A Small Entity Affidavit is of record in the prior application.

3. _____ The filing fee is calculated below:

Claims remaining in the application after entry of any amendments under 37 C.F.R. 1.116 unentered in the prior application and less any claims canceled by amendment below:

	(Col. 1)	(Col. 2)	SMALL ENTITY			OTHER THAN A SMALL ENTITY	
FOR:	<u>NO. FILED</u>	<u>NO. EXTRA</u>	<u>RATE</u>	<u>FEE</u>	OR	<u>RATE</u>	<u>FEE</u>
BASIC FEE				\$385	OR		\$770
TOTAL CLAIMS	_____ - 20 =	* _____ 0	x11 =	\$ 0	OR	x22 =	\$ _____
INDEP CLAIMS	_____ - 3 =	* _____ 0	x40 =	\$ 0	OR	x80 =	\$ _____
[0] MULTIPLE DEPENDENT CLAIM PRESENTED			+130 =	\$ 0	OR	+260 =	\$ _____
*If the difference in Col. 1 is less than zero, enter "0" in Col. 2.			TOTAL	\$ _____	OR	TOTAL	\$ _____

4. _____ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 20-1497 (Order HALO-009). Two copies of this sheet are enclosed.

5. _____ Our Check No. _____ in the amount of \$ _____ is enclosed.

6. _____ Cancel in this application original claims _____ of the prior application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

7. X Amend the specification by inserting before the first line the sentence:

--This is a x continuation, _____ continuation-in-part, _____ division of application Serial No. 08/513,573 filed August 10, 1995.--

8. _____ Enter the amendments under 37 C.F.R. 1.116 filed on _____ unentered in the prior application.

9. (a) x 5 sheets of Informal drawings are enclosed.

(b) _____ Formal drawings are enclosed.

10. _____ A preliminary amendment is enclosed. (Claims added by this amendment have been properly numbered consecutively beginning with the number next following the highest numbered original claim in the prior application.)

11. (a) _____ Priority of application Serial No. _____ filed on _____ in
_____ is claimed under 35 U.S.C. 119.
- (b) _____ The certified copy has been filed in prior application Serial
No. _____ filed on _____.
12. x The prior application is assigned of record to Halo Electronics,
Inc.
13. X The power of attorney in the prior application is to:

TRIAL & TECHNOLOGY LAW GROUP
A Professional Law Corporation
545 Middlefield Road, Suite 220
Menlo Park, California 94025

- (a) X The power appears in the original papers in the prior
application.
- (b) _____ Since the power does not appear in the original papers, a
copy of the power in the prior application is enclosed.
- (c) _____ A new power has been executed and is enclosed.
- (d) _____ Address all future communications to:

TRIAL & TECHNOLOGY LAW GROUP
A Professional Law Corporation
545 Middlefield Road, Suite 220
Menlo Park, California 94025

14. _____ A preliminary amendment and Rule 132 declaration will be submitted
when formal filing receipt is received.

15. X I hereby verify that the attached papers are a true copy of prior
application Serial No. 08/513,573 as originally filed August 10, 1995

Date: August 6, 1997

Signature: 
Stephen E. Baldwin,
Reg. No. 27,769

Address of Signer:

545 Middlefield Road, Suite 220
Menlo Park, CA 94025
(415) 324-2223

Inventor(s)

Assignee of complete interest

X_____
Attorney or agent of record

Filed under Section 1.34(a)

ELECTRONIC SURFACE MOUNT PACKAGE5 BACKGROUND OF THE INVENTION

The present invention relates to an electronic surface mount package or case. Electronic surface mount packages are utilized in applications in which one or more individual toroid transformers are embodied within the surface mount package.

10 Wires coming off the transformers are electronically tied to pins on the package for connection to an electronic device. Typically, the electronic surface mount packages are mounted on a printed circuit board for utilization in the electronic device.

15 SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved electronic surface mount package.

20 Briefly, according to one preferred embodiment, the present invention provides a one piece construction package (with an open bottom) with one or more terminal pins molded into the package. Each of the pins have a notched post upon which a wire is wound which is from a toroid transformer carried within the package. Each of the posts are notched so that the respective wires are separated from one another so as to avoid arcing. The case is open at the bottom which prevents harm from expansion or cracking.

25 Other objects, features, and advantages of the present invention will become apparent from the following detailed description when taken in conjunction with the accompanying drawings.

30 BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention:

Figure 1 shows an electronic surface mount package in three-dimensional view according to the present invention.

Figure 2 shows a wound toroid transformer.

Figure 3 shows the connection of the toroid transformer of Figure 2 within the electronic surface mount package of Figure 1.

Figure 4 shows the electronic surface mount package of Figure 1 after wire terminations have been soldered.

Figure 5 and 6 show relationships between a safeguard (standoff) and the electronic surface-mount package's foot seating plane and inner terminal posts, respectively.

Figure 7 shows a close-up of the pin configuration of Figure 1 and how it is molded inside the wall of the body of the package.

Figure 8 shows wire wrapped around the pin or post of Figure 7.

Figures 9A -9D show end, top, side, and bottom views of electronic surface mount package according to the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

Reference will now be made in detail to the preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings, where like numerals indicate like components. While the invention will be described in conjunction with the preferred embodiments, it will be understood that they are not intended to limit the invention to those embodiments. On the contrary, the invention is intended to cover alternatives, modifications and equivalents, which may be included within the spirit and scope of the invention as defined by the appended claims.

Figure 1 shows an electronic surface mount transformer package or case 10 in three-dimensional view. Figure 1 shows a cut-away of the generally rectangular empty case 10 with pins 14 molded into the case 10, together with notched post 12 upon which a wire is wound. Typically, tin-Lead plated copper

alloy terminals are molded into the wall of the package 10. The outer portion of the package 10 is formed to meet specified footing requirements. The inner post 12 serves as a terminal for internal wire termination use. The package material is made of a type of thermal plastic which is in compliance with UL V-94 requirement for flammability.

Figure 2 shows a wound toroid transformer 20 with wire 22 wrapped around the transformer 20. The toroid core is typically made of ferrite or iron material and the winding of wire 22 is done manually with fine insulated magnet wire.

Figure 3 shows a cut-away of the molded part with the toroid 20 mounted inside and showing the wire 22 as it is then attached to post 14. The wires 22 are pulled with minimum tension and wrapped around the terminal post 14 for two to two and a half turns. This operation is done when the case has been placed bottom side up.

Figure 4 shows a silicon compound 30 poured inside the cavity with wire terminations that have been soldered with high temperature solder (95 Ag/5Sn) 32 and the package has been properly cleaned. The case 10 is then filled with soft silicone material to protect the transformer and to meet environmental requirements.

Figures 5 and 6 show the relationships between the safe guard (stand off) 34 and package's foot seating plane and inner terminal posts 12a. Figure 5 shows the standoff 34, in which the parts typically are placed automatically by machine onto a PC board. They are pressed down, as it is desirable to have some limitation of how far they can be pressed. It is also desirable that the post 12 does not touch the PC board, and so the end standoffs 34 do not allow that to happen.

Figure 6 shows the distance in relationship between the end of the post 12 and where the PC board 36 is located and also where the standoff 34 ends. The PC board 36 would be at the base of the foot.

In Figure 6, the typical clearance of 0.015 inches from the safe guard 34 to the seating plane is to avoid

interference to the coplanarity of the package. There is also a gap between the safe guard 34 and terminal post 12 to prevent the solder joints from touching the circuit board due to an over forced pick and place operation.

5 Inside the package 10, there may be two, three, or more individual toroidal transformers. Wires coming off of the transformers are connected to the outside world. For example, the pins may be mounted on a printed circuit board in an electronic device. The lead frame pins are injection molded and the shape of the post upon which the wire is wound from the toroidal transformer is notched. This allows for the wires to be separated from pin to pin, and for soldering to be much more efficient.

15 Figure 7 shows a closeup of the pin 12 and how pin 12 is molded inside the wall of the body and also the notch effect 40 of the pin 12. The post 14 is notched so that the wires are kept away from one another (post to post) which is very desirable. The separation is desirable so as to avoid arcing.

20 Figure 8 shows the wire 22 wrapped around the pin or post 12.

Figures 9A-9D show end, top, side, and bottom views, respectively, of the electronic surface mount package 10. The embodiment shown in Figures 9A-9D provide an industrial standard surface mount footprint and package dimensions which are auto pick and placeable. In addition, special design consideration has been applied to thermal expansion of materials to ensure that the package will stand all normal reflow processes with low cost, easy manufacturing, and high reliability.

30 In the industry, many manufacturers have used a two-piece construction, a base and a cover, and the case is backfilled with epoxy. In some processes, the coefficients of expansion of the epoxy that has been backfilled, plus the toroid itself, tend to cause the two pieces to separate. The base separates from the top, and as a result, it can end up cracking. The

present invention provides a one-piece construction (an open bottom) only with the silicon filling to protect the toroid. The case is open at the bottom, thus allowing for nothing to expand or crack.

- 5 The foregoing descriptions of specific embodiments of the present invention have been presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, and it should be understood that many modifications and variations are possible in light of the above teaching.
- 10 The embodiments were chosen and described in order to best explain the principles of the invention and its practical application, to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the Claims appended hereto and their equivalents.
- 15

CLAIMS:

1. An electronic surface mount package comprising:
a one piece construction package having an open
bottom,
one or more toroid transformers carried within said
package, said toroid transformers each having wires wrapped
thereon,
one or more terminal pins molded within said
package, each of said pins having a notched post upon which
said wires from said transformers are wrapped thereon,
respectively.

ABSTRACT OF THE DISCLOSURE

5 An electronic surface mount package provides a one piece construction package (with an open bottom) with one or more terminal pins molded into the package. Each of the pins have a notched post upon which a wire is wound which is from a toroid transformer carried within the package. Each of the posts are notched so their respective wires are separate from one another so as to prevent arcing. The case is opened at the bottom which prevents harm from expansion or cracking.

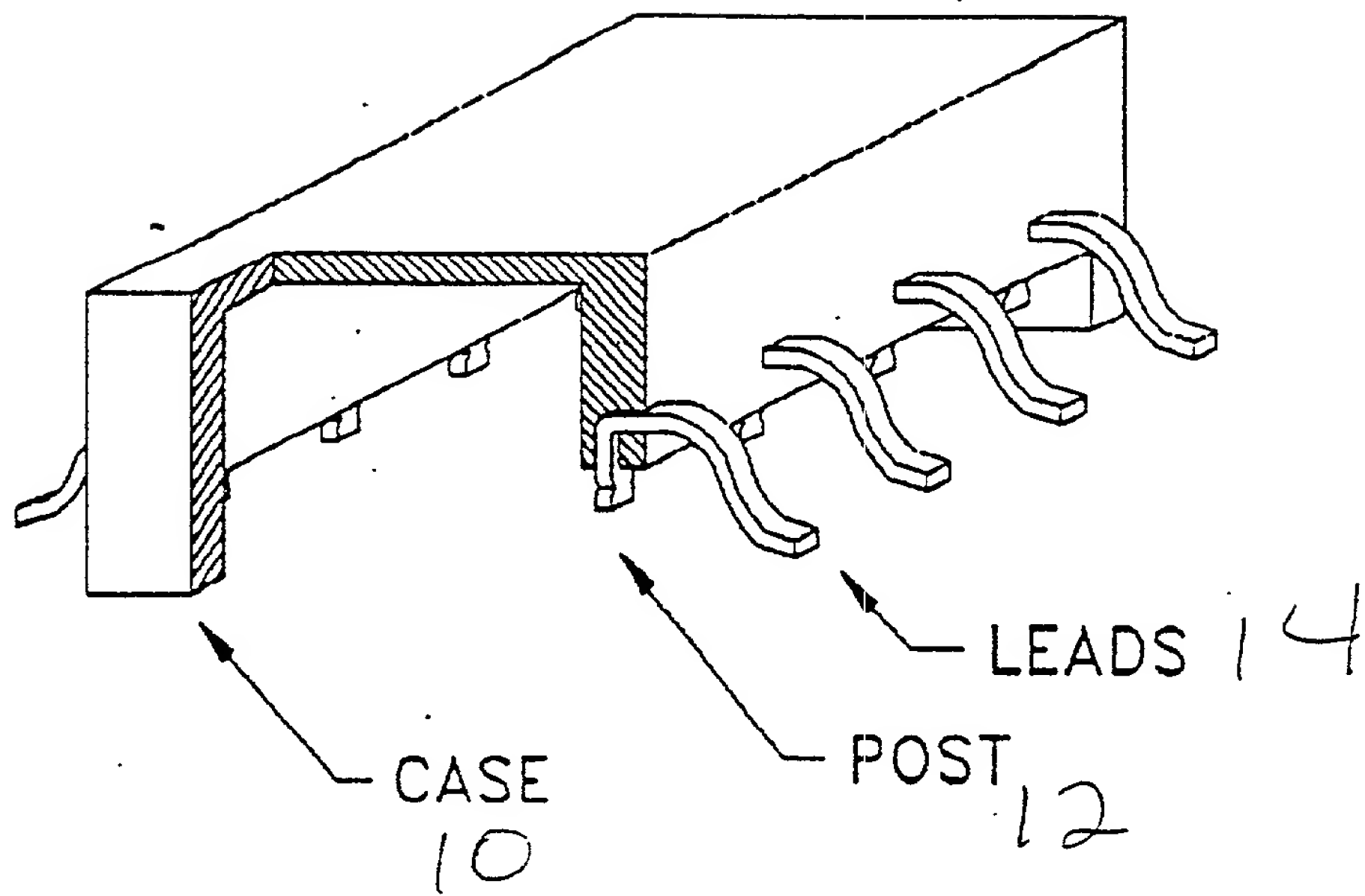


FIGURE 1

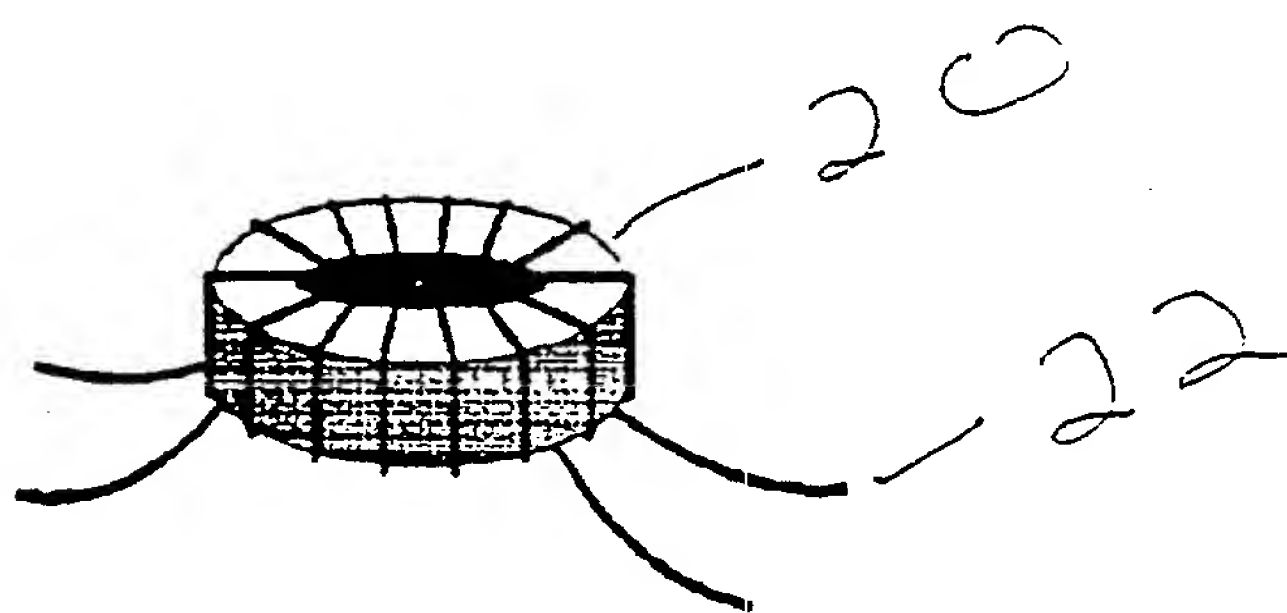


FIGURE 2

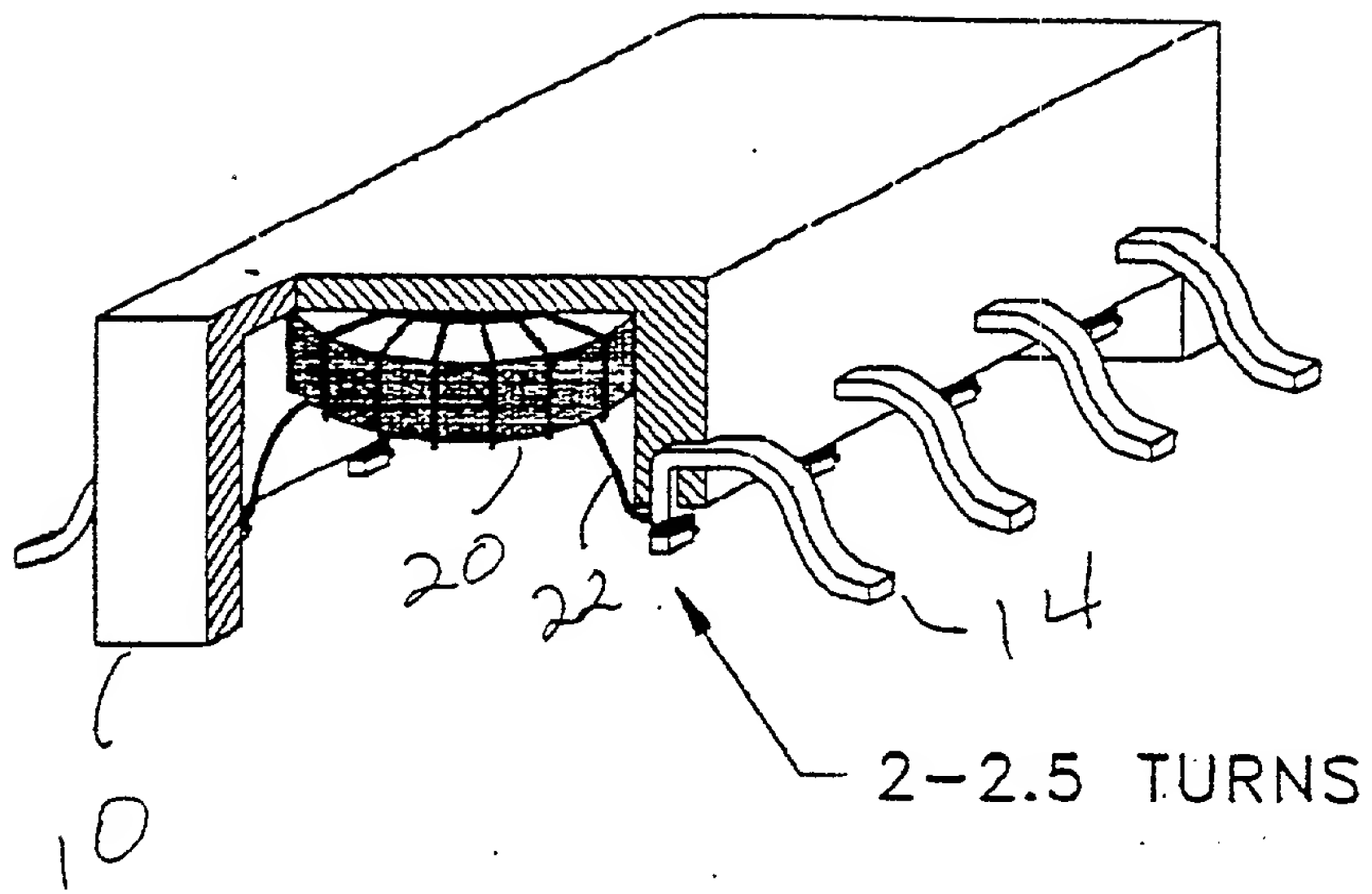


FIGURE 3

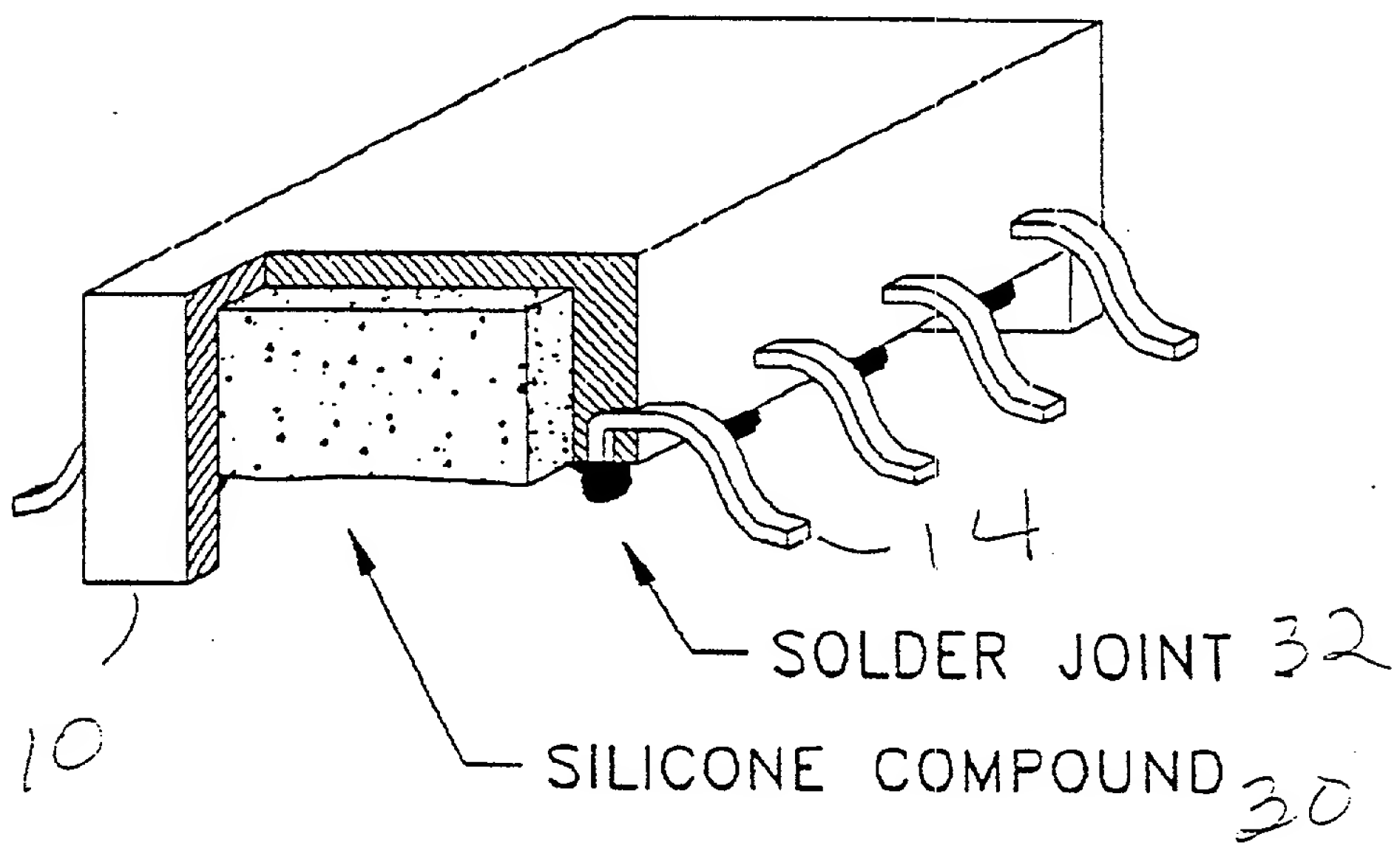


FIGURE 4

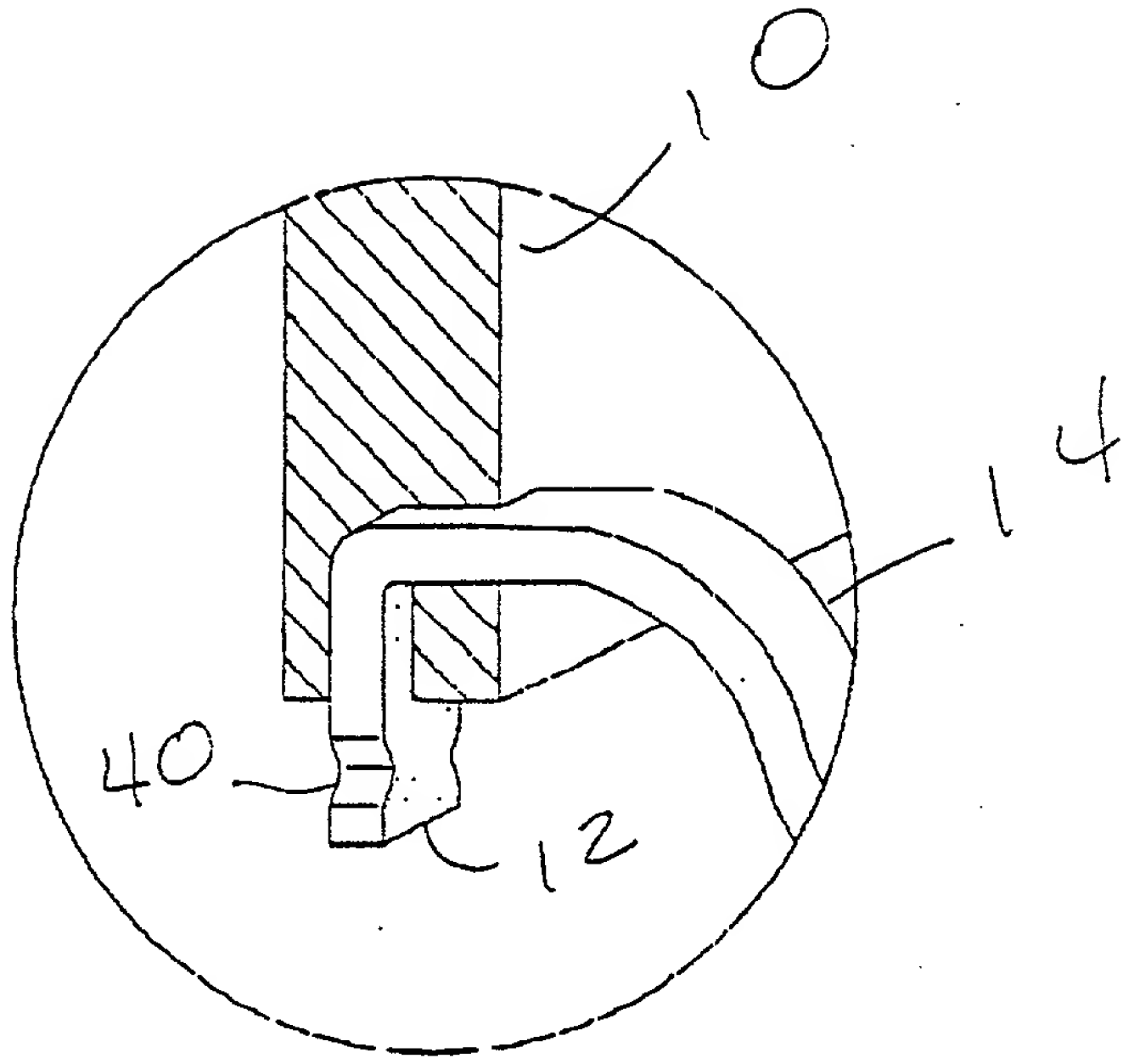


FIGURE 7

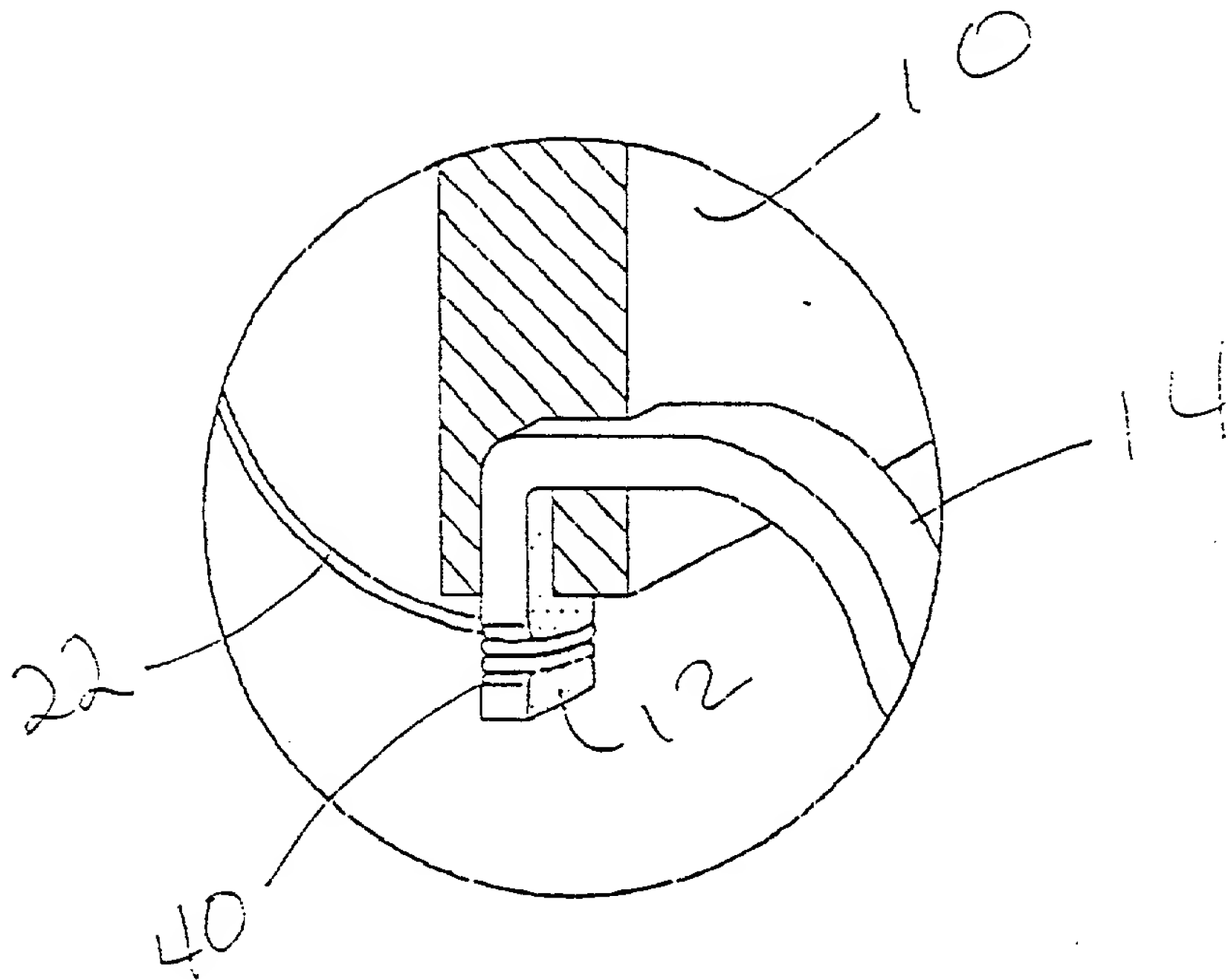
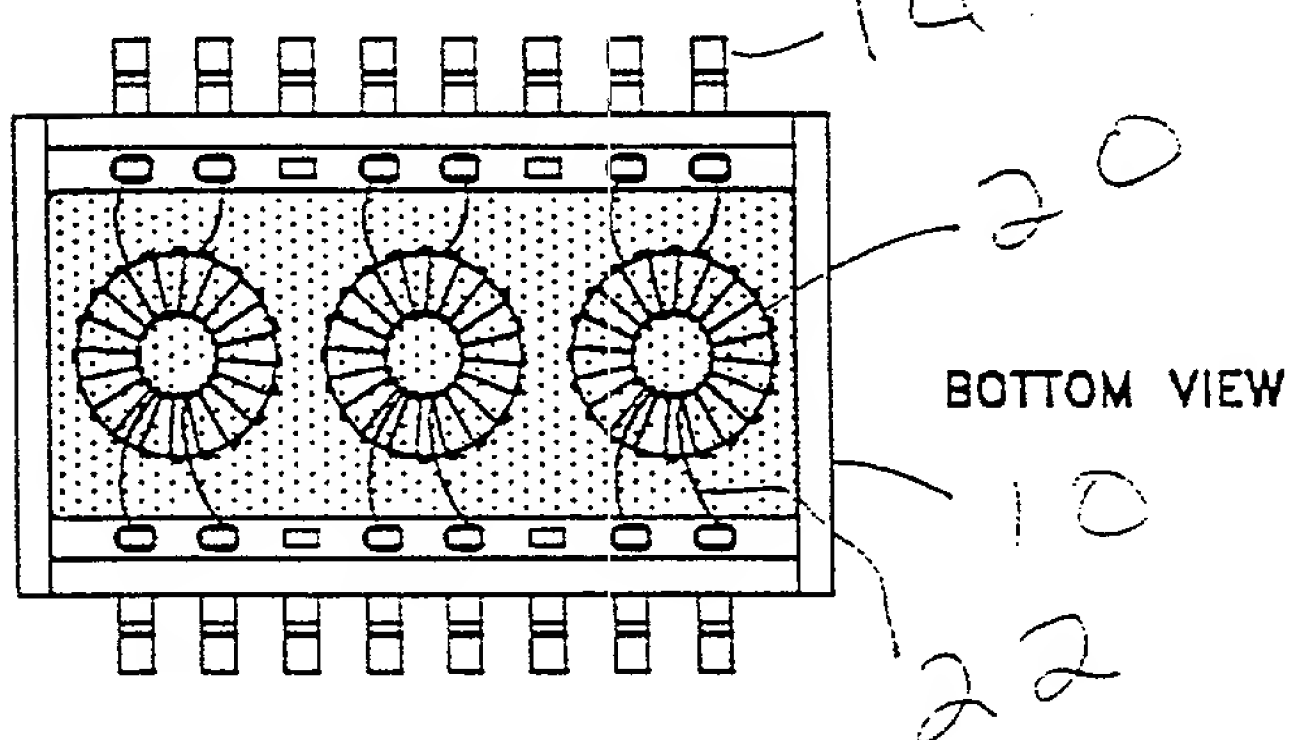
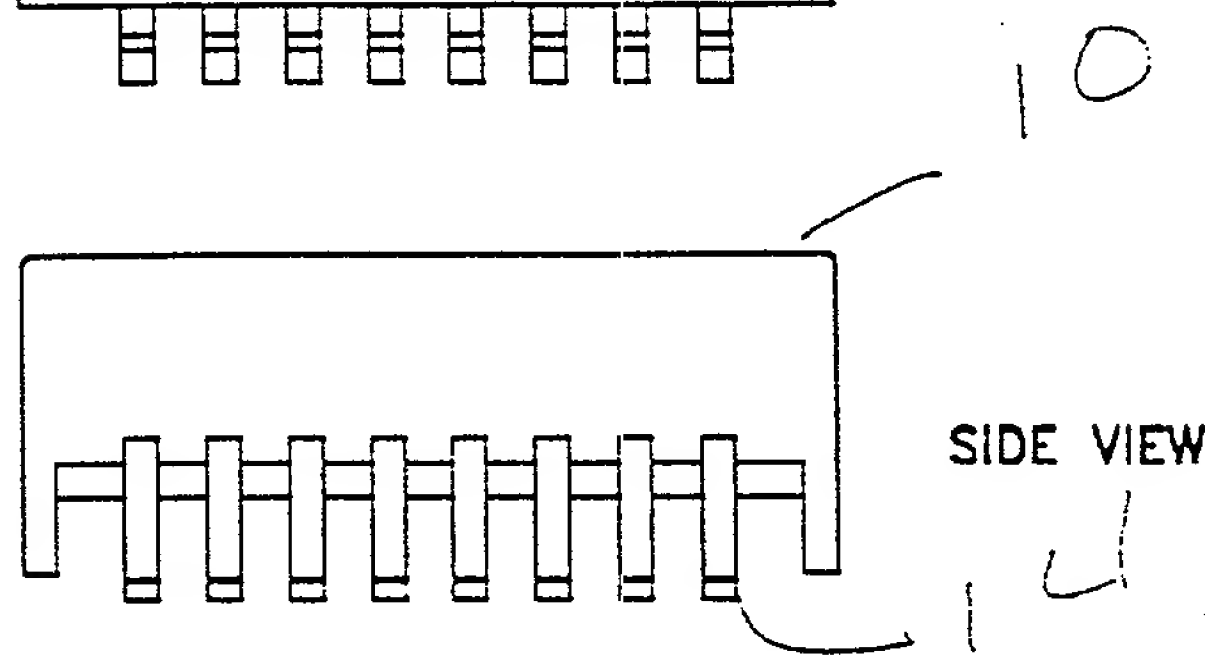
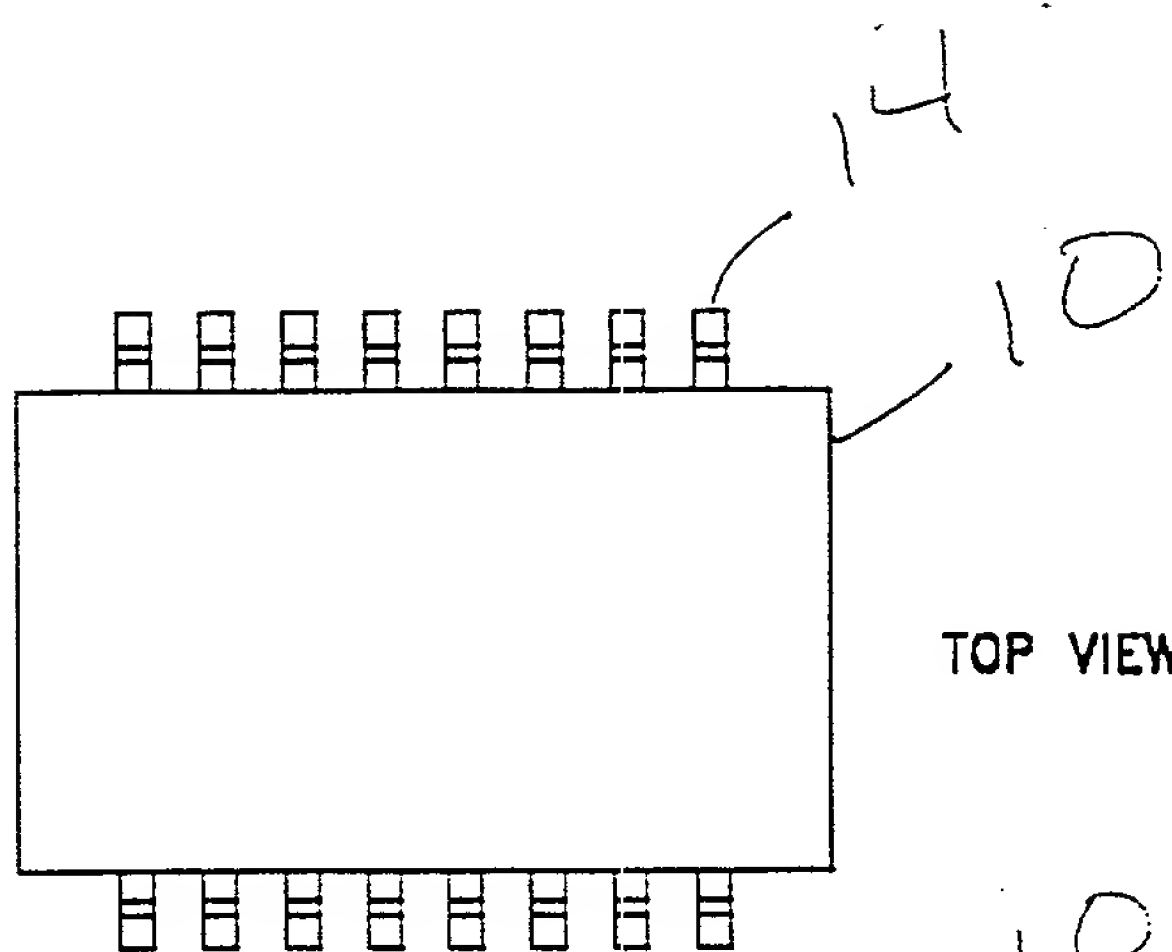
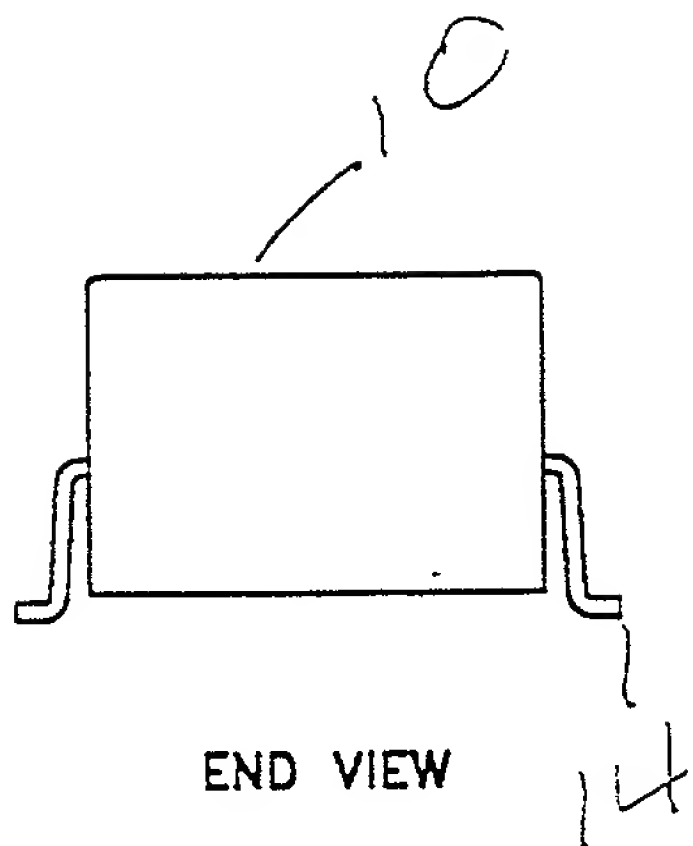


FIGURE 8

FIGURE 9-A



9-B

9-C

9-D

FIGURE 9

DECLARATION FOR PATENT APPLICATION

As a below-named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled ELECTRONIC SURFACE MOUNT PACKAGE, the specification of which:

(check one) ☐ is attached hereto
☒ was filed on 8/10/95 as
Application Serial No.08/513,573
and was amended on October 9, 1996 and January 9, 1997

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to me to be material to patentability of this application as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed: (none)

Prior Foreign Application(s)			Priority Claimed	
			<input type="checkbox"/>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
			<input type="checkbox"/>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56, which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.) (Filing Date) (Status)(patented, pending, abandoned)

(Application Serial No.) (Filing Date) (Status)(patented, pending, abandoned)

Direct all telephone calls to Stephen E. Baldwin at (415) 324-2258.

Address all correspondence to:

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Menlo Park, CA 94025

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, §1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Inventor's signature: 

Date: 5-19-97

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Citizenship: U. S. Citizen

Post Office Address: 194 Civic Circle Lewisville, TX 75067

Full name of second joint inventor, if any: Jeffrey Heaton

Inventor's signature: 

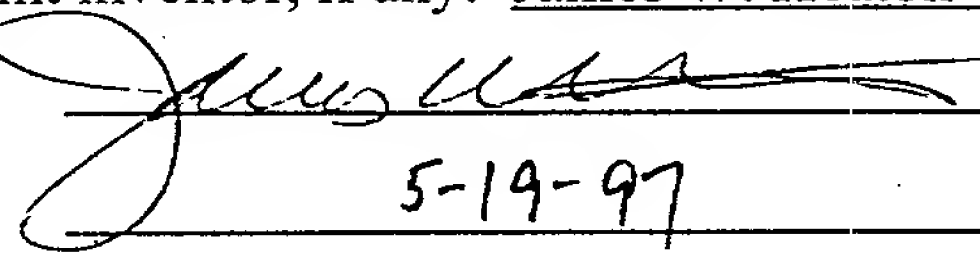
Date: 5-19-97

Residence: 19832 Rodrigues Cupertino, CA 95014

Citizenship: U. S. Citizen

Post Office Address: same

Full name of third joint inventor, if any: James W. Heaton

Inventor's signature: 

Date: 5-19-97

Residence: 1963 Fallen Leaf Lane, Los Altos, CA 94024

Citizenship: U.S. Citizen

Post Office Address: same

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Inventor's signature: *Peter Loh*
Date: 5/19/97
Residence: 10 Carnarvon Road, 8/F, A-1, Kowloon, Hong Kong
Citizenship: China
Post Office Address: same

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Citizenship: Hong Kong
Post Office Address: same

Full name of sixth joint inventor, if any: Tsang Kei Sun
Inventor's signature: *Ts. Kei Sun*
Date: 5/19/97
Residence: Flat F, 19/F, Tower One, Belvedere Garden, Phase Two,
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Citizenship: Hong Kong
Post Office Address: same